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DEVELOPMENT AND PRESENTATION OF
A NATIONAL WAR COLLEGE ELECTIVE COURSE
TO DEMONSTRATE THE USE OF
QUANTITATIVE TECHNIQUES IN THE STUDY
OF INTERNATIONAL RELATIONS

VOLUME I
COURSE DESCRIPTION AND SYLLABUS

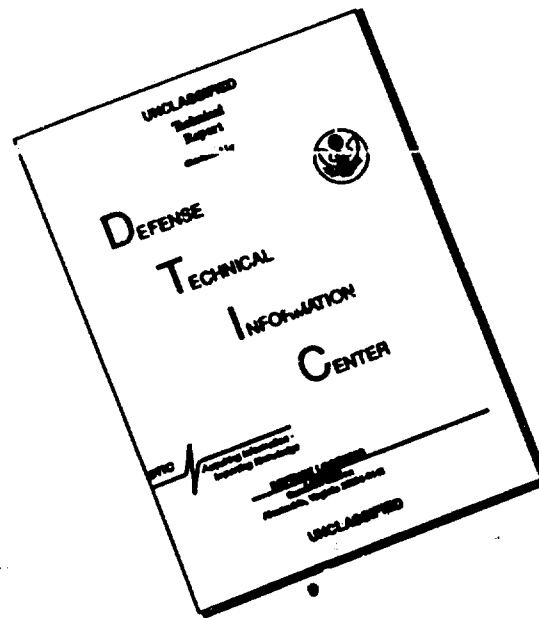
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PREFACE

Because of the unique nature of this course, some explanation of its background, scope and objectives probably would be useful.

In June 1970, Consolidated Analysis Centers Inc. began an ARPA-supported study of how computers might be used to aid the educational program of the National War College.* Growing out of that study was the concept of an elective course to demonstrate, in a realistic classroom setting, the use of quantitative techniques in the study of international politics—a subject area representing about 90 percent of the National War College Curriculum. This course on quantitative techniques was designed and presented as an experimental elective to a small group of National War College students and faculty from February 12 to April 15, 1971. In addition to the National War College, representatives of the Naval Academy, the Army War College, and other government agencies attended one or more sessions.

Based in part on the materials developed for that course, this package has been assembled for use by other schools and organizations to aid in the presentation of a similar course. The scope, objectives, and subject material are strongly influenced by the type of student and type or organization for which the course is planned. There are major constraints placed by the type of institution itself:

- The course must be relevant to the overall mission of the institution.
- The course must supplement, not replace, current courses.
- The course must be self-contained. Since the academic year at the War Colleges is approximately ten months, there is no time for the students to take preliminary courses to serve as introductions or prerequisites.

* Consolidated Analysis Centers Inc., "Computer Applications and Implementation Study for the National War College," Vols. I-III, Final Report for ARPA Contract DAHCl5-C-71-0263, January, 1971.

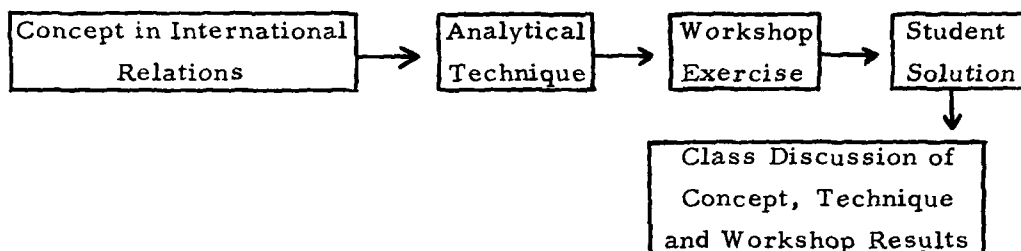
- There is a severe time constraint. This course package is planned for 20 two-hour class periods, about the maximum time available for an elective course.

Characteristics of the students determined some of the course characteristics:

- Many of the students are members of the military services, the Foreign Service, and other governmental agencies. The students will occupy high-level policy-making positions in the future.
- Students are all on the post-graduate level; many have advanced degrees. However, many electing this course may not have backgrounds in each of the following areas: statistics, computer technology, and international relations. (Students with background in each area probably would not elect this course). Therefore, a requirement of the course is that it include material relevant to each of these subjects.

Recognizing the future of the students as decision-makers and not scholars, analysts, researchers, or computer technicians, the instruction in quantitative techniques is set at the minimum level which they could hope to usefully apply in their future decision-making positions. Thus, the central objective of this course is to introduce the students to quantitative techniques, their value and their limitations. Believing that the best teaching device is actually doing rather than listening to a description, this course is designed around the concept of providing computer workshops in which the students carry through analyses themselves.

The design principle of the course is illustrated below:



This sequence: Concept → Technique → Workshop → Solution → Discussion is repeated four times with the sophistication of analytical techniques employed increasing with each sequence. Thus, the student progresses from examination and display of data to studying relationships between variables to formulating and testing hypotheses. In the last part of the course he is introduced to simulation in an international relations subject matter environment. The four sequences in the course are:

IR Concept

Technique

National Power

Simple examination and display of a data-file

Conflict

Correlation of two variables

Alliances

Hypothesis testing

The Making of Foreign-Policy Decisions

Simulation

The range of subject matter is monumental; the time available, always too short. Thus, it is clear that only the surface of each subject can be touched. In the constant trade-offs between scope and detail, scope usually wins. The students will go deeper into the concepts themselves in their other courses; here, the emphasis was on answering the question "How can computer technology and quantitative methods be of use to the policy-maker?"

In a normal university environment a course called "Quantitative Techniques in International Relations" would be offered to political science majors who are preparing for careers in research or teaching. The course discussed herein serves an entirely different purpose; students taking it probably will never personally carry through an analytical study or prepare a lecture for a class in International Relations. What will occupy them is the hard day-to-day struggle with the higher-level policy decisions. The purpose of this course, then, is to suggest and illustrate that computer technology and the quantitative approach can be of some direct value in this work.

COURSE PARTICIPANTS

The following people contributed to the development and presentation of the course and participated in the preparation of the report and the "Package Course" development. Most people contributed in many ways, the listed roles are only the primary ones.

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Professor Raymond Tanter, University of Michigan
Professor Charles Taylor, Virginia Polytechnic Institute

COURSE SCOPE AND OBJECTIVES

Academic Level

This course is designed primarily for graduate level students at the senior service schools.* These students will have had broad experience in military and foreign service, but not necessarily formal training in international relations prior to entering the War Colleges. This course is designed, on the one hand, to be self-contained—i. e. , all analytical and computer techniques required will be presented—and at the same time to accompany and complement the schools' core curricula.

Course Purpose

The purpose of the course is to provide through lectures, seminar discussions, work sessions with computer-based methods and assigned readings:

- An introduction to quantitative studies of international affairs.
- A survey of selected theories in international politics that are relevant to empirical research.
- The opportunity to get "hands-on" experience in using data analysis and computer simulation to explore selected policy-relevant problems.
- Participation in critique sessions in which the techniques are analyzed, and reviewed for validity and relevance to actual policy-problems.

*Suggestions for adapting the course material to undergraduate classes are given in the last section.

Course Scope

The course will deal with three general subjects:

- Overview of the quantitative approach to international politics
- The use of quantitative data and statistical techniques in the investigation of foreign policy problems
- The use of models and simulations in the study of international politics.

Course Organization

The course covers two major quantitative techniques: data file analysis and simulation. It is organized into four principal sections shown in the Course Outline in Table 1. It is planned for 20 two-hour sessions, consisting of formal lectures, computer-based workshops, and informal class discussion and critique periods.

This course is planned to be given through a series of lectures, group discussions, and computer workshops. The subject material dealing with international relations is organized into three major areas: national power, international conflict, and alliance formation. Alternating with lectures in these areas are presentations of the analytical techniques the students will use in the workshops. These technique-oriented presentations start with simple data handling and display operations and progress to curve-fitting and hypothesis testing. Not designed to replace a more formal course in statistics, these presentations stress the meaning for the policy-maker of results obtained through these techniques rather than their mathematical foundations.

Following the work in data-file analysis, the students are introduced to the subject of simulation and given the opportunity to play one of the latest and

Table 1
GENERAL COURSE OUTLINE

Part I.	PERSPECTIVES: THE ROLE OF ANALYSIS IN INTERNATIONAL POLITICS (3)*
Part II.	THE ANALYSIS OF QUANTITATIVE DATA (10) Power (2) International Conflict (5) Alliances (3)
Part III.	SIMULATION (6) Introduction and Survey (1) Domestically-Oriented Models (1) Models of the International System (3) Discussion (1)
Part IV.	COURSE SUMMARY: THE VALUE OF QUANTITATIVE TECHNIQUES (1)

*Numbers in parentheses are the number of class periods devoted to the topic.

most sophisticated of the international games: PRINCE* (Programmed International Computer Environment), designed by William Coplin and Michael O'Leary, Syracuse University.

The course is planned to end with a group discussion, in which the instructor reviews very briefly the techniques that have been presented. Then the students are encouraged to express their views and attitudes toward the use of these techniques in approaching real policy problems.

Computing Facilities

The course is planned for time-shared computing services accessed by the students from remote terminals. Standard teletype terminals operating at 10 characters per second are adequate; faster terminals are more convenient for the students, but are not required.

Two computing services were used during the National War College courses:**

Data File Analysis: University of Michigan Computing Service
(IBM 360/65)

Simulation: International Telephone and Telegraph's Reactive
Terminal Service (IBM 360/65)

The student manuals included in this course package (Volume II) and the Instructor's Supplement (Volume III) contain instructions for using these services. They are, however, reasonably standard and the instructions can be readily adapted to other services.***

* In the interactive version developed by C. A. C. I. for the National War College course under ARPA sponsorship.

** A third system, DIALCOM, was used for playing NEXUS. See Session 15 in the Course Syllabus, p. 36.

*** However, obtaining elsewhere a set of statistical routines comparable to those available on the Michigan system is not currently possible. See the discussion in Volume II.

The Course Package

A course package based on the materials developed for the National War College students including additional and expanded materials has been assembled for use by other schools and organizations for the presentation of a similar course.*

The package is divided into three volumes. The first volume contains a description of the course and material for a course syllabus. The second volume consists of material dealing with the workshops and use of the computer. There are two principal sections:

- Student Manual for Data-File Analysis
- Student Manual for Simulation

The third volume is intended principally as an aid for the instructor in preparing the lectures and workshops. It contains three parts:

- A set of lecture notes
- Examples of background clippings for the PRINCE presentation
- Guides to the computer workshops

The lecture notes are based in part on the lectures presented at the National War College. These transcribed versions of oral presentations have not been edited to the point of becoming polished written papers. They are intended to furnish starting points for the course instructors, who will no doubt wish to expand areas that appear of particular importance to them or of particular interest to the students.

The use of news clippings as background readings during the playing of PRINCE is optional. This section includes samples of the kinds of items

* A version of the course will be presented at the Army War College in the fall of 1971 and an intensive short version at the Foreign Service Institute in the spring of 1972.

that may be used. The instructor may add some from the period immediately preceding the game sessions.

The third section is intended to provide guidance to the instructor in handling the computer workshops. It includes also complete documentation for the PRINCE model.

COURSE SYLLABUS

This section includes that material generally given to the students before the first class period. It includes for each class session:

TITLE

Objectives

Here the objectives are stated from the viewpoint of the instructor; that is, as teaching goals to be achieved by the lecture, workshop, or discussion. For the student syllabus, the instructor may wish to restate them from the students' viewpoint.

Required readings

Copies of these readings are given to each student at the beginning of the course. The readings are chosen to be directly related to the class work, and one of the course requirements is that he read the assignments before each class period.

Additional readings

These references are usually made available in the school library. They are intended to furnish background material; the students are required to glance over them and read at least a few during the course.

Discussion questions

These cover the principal points of the class session. For the formal lecture periods, they may represent points that the student should think about and try to answer from his reading as part of his preparation for the class. For the discussion periods, they may serve as the basis for the dialog between students and instructor. For the workshops, they may represent questions to be answered by the students from their own work at the terminals.

Session I. Lecture

DATA AND THE INTERNATIONAL POLICY-MAKER

Objectives

To examine constraints on the actions of high-level policy-makers.

To discuss the implications of these constraints for problem-solving methodology.

To demonstrate the fit between computer-based techniques and the needs of the policy-maker.

Required readings

Bobrow, Davis and Judah Schwartz, "Computers and International Relations," Computers and the Policy-Making Community (Edited by Bobrow and Schwartz). Englewood Cliffs, New Jersey: Prentice-Hall (1968), ch. 1, pp. 1-19.

Bobrow, Davis, "International Interactions: Surveys and Computers," Ibid., ch. 6, pp. 81-110.

Additional readings

Lieberman, Seymour, "The Effects of Changes in Roles on the Attitudes of Role Occupants," Human Behavior and International Politics (Edited by J. David Singer). Chicago: Rand-McNally (1965), pp. 155-168.

Miller, James G., "The Individual as an Information Processing System," Ibid., pp. 202-212.

Pfatzgraff, R. L., Jr. "International Study in the 1970's," International Studies Quarterly. Vol. 15, No. 1 (March 1971), pp. 104-128.

Platig, E. Raymond, "International Relations as a Field of Inquiry," International Politics and Foreign Policy (Edited by James Rosenau), New York: The Free Press (1969), ch. 2, pp. 6-19.

Russett, Bruce M., "The Young Science of International Politics," World Politics, Vol. XXII, No. 1 (October 1969), pp. 87-94.

Discussion questions

What are some of the constraints faced by policy-makers on the higher levels?

Can you characterize the major types of tasks carried out by these policy-makers?

How could data and the ability to handle it rapidly be of value in high-level decision-making?

Contrast the handling of data by computer with manual methods.

Session 2. Lecture

THE UTILIZATION OF QUANTITATIVE RESEARCH IN POLICY-MAKING:
PAST EXAMPLES AND FUTURE PROSPECTS

Objectives

To present specific examples of the use of quantitative techniques in policy-making.

To examine the future of quantitative research in this area.

To discuss some of the difficulties of quantitative work.

Required readings

Deutsch, Karl, et al., "The Yale Political Data Program," Comparing Nations (Edited by Richard L. Merritt and Stein Rokkan). New Haven: Yale University Press (1966), pp. 81-94.

McClelland, Charles A. and Gary D. Hoggard, "Conflict Patterns in the Interactions Among Nations," International Politics and Foreign Policy, Second Edition (Edited by James N. Rosenau). New York: The Free Press (1969), pp. 711-716.

Rummel, Rudolph J., "The Dimensionality of Nations Project," Comparing Nations (Edited by Richard L. Merritt and Stein Rokkan). New Haven: Yale University Press (1966), pp. 109-129.

Singer, J. David, "Knowledge, Practice, and the Social Sciences in International Politics," A Design for International Relations Research, Monograph #10 of the American Academy of Political and Social Science. Philadelphia, Pennsylvania (October 1970), pp. 137-149.

Yuill, Major S. J., USA, "Quantitative Information for Strategic Decisions," Naval War College Review, Vol. XXIII, No. 3, November 1970, pp. 16-29.

Additional readings

Friedheim, R. L. and J. B. Kadane, "Quantitative Content Analysis of the United Nations Seabed Debate: Methodology and a Continental Shelf Case Study," International Organization, Vol. XXIV, No. 3 (1970), pp. 479-502.

Galtung, Johann, "East-West Interaction Patterns," Social Processes in International Relations (Edited by Louis Kriesberg). New York: John Wiley and Sons, Inc. (1968), pp. 272-307.

McClelland, Charles A., "Access to Berlin: The Quantity and Variety of Events, 1948-1963," Quantitative International Politics (Edited by J. David Singer). New York: The Free Press (1968), pp. 159-186.

Rosenau, James N. (ed.), International Politics and Foreign Policy, Second Edition. New York: The Free Press (1969).

Pflatzgraff, R. L., Jr., "International Study in the 1970's," International Studies Quarterly. Vol. 15, No. 1 (March, 1971), pp. 104-128.

Discussion questions

What characteristics of quantitative techniques should be considered in evaluating them for use in policy studies?

What are the common characteristics of the examples discussed here (and in the readings) that allowed the use of quantitative techniques?

Can quantitative information be employed for purposes for which non-quantitative information cannot?

How can a policy-maker determine when to use quantitative studies in his decision-making?

In what areas are quantitative techniques most likely to find use in the future?

Session 3. Lecture

DATA, COMPUTERS, AND RESEARCH DESIGN

Objectives

To explore differences between inductive and deductive research methods.

To present the steps in the "classical" approach to quantitative research in preparation for the student workshops.

To examine the role of data and computers in research.

Required readings

Churchman, C. W., R. L. Ackoff, and E. L. Arnoff, "The Phases of O.R.," Introduction to Operations Research. New York: John Wiley & Sons, Inc. (1957), pp. 12-15.

Selltiz, C., M. Jahoda, M. Deutsch, and S. W. Cook, "Selection and Formulation of a Research Problem," Research Methods in Social Relations. New York: Henry Holt and Company (1959), ch. 2.

Additional readings

Holsti, Ole R., Robert C. North, and Richard A. Brody, "Perception and Action in the 1914 Crisis," Quantitative International Politics (Edited by J. David Singer). New York: The Free Press (1968), pp. 123-158.

Russett, Bruce M., "The Young Science of International Politics," World Politics, Vol. XXII, No. 1 (October 1969), pp. 87-94.

Smoker, Paul, "A Time-Series Analysis of Sino-Indian Relations," Journal of Conflict Resolution, Vol. XIII (1969), pp. 172-191.

Young, Oran, "Professor Russett: Industrious Tailor to a Naked Emperor," World Politics, Vol. XXI, No. 3 (April 1969), pp. 486-511.

Discussion questions

Contrast the steps in a quantitative vs. non-quantitative study. At what point do they begin to differ?

Can quantitative information be employed for purposes for which non-quantitative information cannot?

What is the role of the computer in quantitative work in international relations? To what extent is the computer necessary to quantitative study?

Contrast the inductive and deductive research approaches. What are some advantages and disadvantages of each?

Session 4. Lecture/Workshop

INTRODUCTION TO DATA-FILE OPERATIONS/DISPLAY AND
EXAMINATION OF DATA

Objectives

To define the characteristics of social science data.

To describe the basic data-handling skills: collection, storage, retrieval, display, and analysis.

To present the elementary concepts of descriptive statistics: measures of location and measures of dispersion.

To introduce the students to terminal operations.

To provide an opportunity for the students to display and describe data through the computer.

Required readings

From the Student Manual for Data File Analysis*

"Instructions for Terminal Operations," pp. I-2 to I-5.

"Statistical Packages: CONSTAT and TIMESERIES," pp. I-6 to I-27.

"The WEISDAT/T Data-File," pp. I-39 to I-41.

Blalock, Hubert M., "Introduction: Purposes and Limitations of Statistics," Social Statistics. New York: McGraw-Hill Book Company, Inc. (1960), ch. I, pp. 3-7.

Blalock, Hubert M., "Theory, Measurement, and Mathematics," Ibid., ch. 2, pp. 8-20

Garson, G. David, Handbook of Political Science Methods. Boston: Holbrook Press, Inc. (1971), pp. 77-78, 94-99.

* See Part I, Volume II of this course package; this manual should be given to the students at the beginning of the course.

Additional readings

Alker, Hayward R., Mathematics and Politics. New York: The Macmillan Company (1965), ch. 1 and 2, pp. 1-28.

Bernd, Joseph L. (ed.), Mathematical Applications in Political Science, II. Dallas: Southern Methodist University Press (1966).

Blalock, Hubert M., Social Statistics. New York: McGraw-Hill Book Company, Inc. (1960), Part II, pp. 25-88.

Garson, David G., Handbook of Political Science Methods. Boston: Holbrook Press (1971).

Janda, Kenneth, "Recording Political Data on Punchcards," Data Processing, Northwestern University Press (1965), ch. II, pp. 15-45.

McNemar, Guinn, Psychological Statistics. New York: John Wiley & Sons, Inc. (1969).

Discussion questions

How do political science data differ from data in the physical sciences?

Identify ways of collecting data on international behavior.

Formulate hypothetical questions that might be answered by:

- computation of the arithmetic mean of a data set
- computation of the variance of a data set
- a histogram of the data

Session 5. Lecture
CONCEPTS OF NATIONAL POWER

Objectives

- To present alternative ways of defining "power."
- To discuss the various roles of power in international politics.
- To discuss the concept of operationalizing "power."

Required readings

McClelland, Charles A., "Power and Influence," Theory and the International System. New York: The Macmillan Company (1966), pp. 61-89.

Moore, James A., and Robert A. Young, "The Quantitative Perspective on International Relations: Some Introductory Analyses." Basic Issues in International Relations (Edited by Peter A. Toma and Andrew Gyorgy) Second Edition. Boston: Allyn and Bacon, Inc. (1972).

Morgenthau, Hans J., "The Elements of National Power," Politics Among Nations, Fourth Edition. New York: Alfred A. Knopf (1966), pp. 106-144.

Additional readings

Bachrach, P. and M. Baratz, "Two Faces of Power." American Political Science Review, Vol. LVI, No. 4 (December, 1962), pp. 947-952.

Claude, Inis L., Jr. Power and International Relations. New York: Random House (1962).

Dahl, Robert A., "The Concept of Power." Behavioral Science, Vol. II (July 1957), pp. 201-215.

Riker, William H., "Some Ambiguities in the Notion of Power." American Political Science Review, Vol. VII, No. 2 (June 1964), pp. 341-349.

Discussion questions

Can you distinguish between "power" and "influence?"—between "power" and "control?"

Discuss the statement by Hans Morgenthau:^{*} "International politics, like all politics, is a struggle for power."

When was France more powerful: under Louis XIV or under Napoleon?

Name at least one quantitative measure of a nation's: political power, or world influence; military power.

Do you think that rankings of the world's nations by each of your quantitative measures would produce the same rank order of nations?

^{*}Morgenthau, Hans J., Politics Among Nations: The Struggle for Power and Peace. New York: Alfred A. Knopf (1966), p. 27.

Session 6. Lecture/Workshop

QUANTITATIVE ASPECTS OF NATIONAL POWER

Objectives

To present methods of examining the relationships between two variables.

To demonstrate use of the correlation coefficient.

To allow the students to investigate the consequences of various definitions of the term "power."

Required readings

From the Student Manual for Data-File Analysis:

"Examples of Analysis through CONSTAT," pp. I-9 to I-17.

"The CAIR Data-File,"* pp. I-28 to I-38.

Fink, Clinton F., "More Calculations About Deterrence," Readings on the International Political System (Edited by Naomi Rosenbaum). Englewood Cliffs, New Jersey: Prentice-Hall, Inc. (1970), ch. II, pp. 187-200.

Garson, G. David, "Correlation," Handbook of Political Science Methods. Boston: Holbrook Press Inc. (1971), ch. 10, pp. 170-184.

German, F. Clifford, "A Tentative Evaluation of World Power." Journal of Conflict Resolution, Vol. 4, No. 1 (March, 1960), pp. 138-144.

Singer, J. David, and Melvin Small, "Alliance Aggregation and the Onset of War, 1815-1945." Quantitative International Politics: Insights and Evidence (Edited by Singer). New York: The Free Press (1968), pp. 247-286.

Additional readings

Blalock, Hubert M., "Correlation and Regression," Social Statistics. New York: McGraw-Hill Book Company, Inc. (1960), pp. 285-301.

Holsti, K. J., "The Concept of Power in the Study of International Relations." Background, Vol. VII, No. 4 (February, 1964), pp. 179-194.

* The Computer Aided International Relations (CAIR) teaching package was developed by Professors Raymond Tanter and Charles Taylor under the International Data Archive (IDA) Project at the University of Michigan.

Discussion questions

Discuss the distribution of "power" among the world's nations on the basis of your analysis in the workshop.

To what extent does this "observed" distribution match your own experience and intuition?

Do descriptive measures of the data in the CAIR file show that different measurements of "power" produce divergent descriptions of how power is distributed among nations?

Do the correlation coefficients produced in the workshop suggest that care be taken to define the exact meaning of "power" when the subject of "power" is being discussed? Do any of the scatter-plots produced in the workshop show relationships in the data which might not show up in a linear correlation coefficient?

If there is a mis-match between your workshop results and your intuition, do you think it is due to:

- numerical errors in the data?
- use of the wrong operational measures of power?
- mathematical errors in the statistical routines?
choice of the wrong statistical techniques for this problem?

What additional data do you think would be helpful in investigating the concept of national power?

Session 7. Lecture

THEORIES OF CONFLICT AND WAR

Objectives

To discuss several theories of conflict.

To present ways of studying conflict.

Required readings

Deutsch, Karl W., "The Point of No Return in the Progression Toward War," op. cit., pp. 60-61.

Holsti, O. R., R. A. Brody, and R. C. North, "The Management of International Crisis: Affect and Action in American Soviet Relations," op. cit., pp. 62-79.

Rapoport, Anatol, Strategy and Conscience. New York: Harper and Row (1964), pp. 48-52, and the critical review in Bulletin of Atomic Scientists, December, 1965.

Pruitt, Dean G., and Richard C. Snyder, "The Study of War: Theory and Method," and "Motives and Perceptions Underlying Entry into War," Theory and Research on the Causes of War. Englewood Cliffs, N. J.: Prentice Hall (1969), Parts I and II, pp. I-34.

Additional readings

Bobrow, Davis B., Weapons Systems Decision. New York: Praeger (1969).

Boulding, Kenneth E., Conflict and Defense. New York: Harper and Row (1962).

Richardson, Lewis F., Statistics of Deadly Quarrels. Pittsburgh: Boxwood Press (1960).

Schelling, Thomas, The Strategy of Conflict. Cambridge: Harvard University Press (1963).

Wright, Quincy, A Study of War. Volumes I and II. Chicago: University of Chicago Press (1942).

Discussion questions

To what extent are any of the political, economic, personality, conspiracy, perceptual, and other explanations for war valid as "single-factor" explanations of war?

Can a war be "rational" for each antagonist, yet "irrational" for the system of which each is a part?

To what extent has the quantitative approach proved useful in policy-oriented studies of war?

Section 8. Lecture

STATISTICAL METHODS OF STUDYING RELATIONSHIPS AMONG VARIABLES/PRESENTATION OF A CLASS EXERCISE ON CONFLICT

Objectives

To introduce ways of computing the degree to which two variables are related.

To present and explain hypothesis-testing.

To present a class exercise involving the formulation of U. S. policy in the Middle East.

To discuss the data-file to be used for the class exercise.

To give the students an opportunity to think about the problem and to discuss possible approaches.

Required readings

From the Student Manual for Data-File Analysis

"The MIDEAST/T Data-File." pp. I-42 to I-45.

Blalock, H. M., "Single-Sample Tests Involving Means and Proportions," Social Statistics. New York: McGraw-Hill Book Company, Inc. (1960), ch. 11, pp. 135-153.

Blalock, H. M., "Testing Hypotheses: The Binomial Distribution," op. cit., ch. 10, pp. 115-133.

Garson, G. David, "Regression and Multiple Correlation," Handbook of Political Science Methods. Boston: Holbrook Press, Inc. (1971), ch. 11, pp. 190-200.

Tufte, Edward R., "Improving Data Analysis in Political Science," World Politics, Vol. XXII, No. 1 (October, 1969), pp. 641-654.

Additional readings

Alker, Hayward, R., Jr., "Causal Inference and Political Analysis." Mathematical Application in Political Science (Edited by Joseph Bernd). Dallas: Southern Methodist University Press (1966), pp. 7-43.

Blalock, Hubert M., Jr., Causal Inference in Non-Experimental Research. Chapel Hill: University of North Carolina Press (1961).

Discussion questions

In preparation for the workshop next session, formulate several hypotheses about the relationship between possible U.S. actions in the Middle East and their consequences. How could the concepts in these hypotheses be "operationalized" with the data that will be available to you? How could the hypotheses be tested through correlation and regression?

Session 9. Workshop

QUANTITATIVE INVESTIGATION OF U. S. POLICY OBJECTIVES
AND ACTIONS IN THE MIDDLE EAST

Objectives

To allow the students to investigate their hypotheses about the relationships between U. S. actions and U. S. objectives in the Middle East.

Required readings

Milstein, Jeffrey S., "American and Soviet Influences on Arab-Israeli Violence: A Statistical Analysis," Prepared for delivery at the Sixty-Sixth Annual Meeting of the American Political Science Association, Los Angeles (September 8-12, 1970).

Additional readings

Holsti, Ole R., Robert C. North, and Richard A. Brody, "Perception and Action in the 1914 Crisis." Quantitative International Politics (Edited by J. David Singer). New York: The Free Press (1968), pp. 123-158.

Smoker, Paul, "A Time Series Analysis of Sino-Indian Relations." Journal of Conflict Resolution, Vol. XIII, No. 2 (June, 1969), pp. 172-191.

(Note: The work reported in these papers was discussed in Session 3, "Data, Computers, and Research Design.").

Discussion questions

See the outline of suggested steps in the Student Manual for Data-File Analysis, p. 1.

Session 10. Discussion

RESULTS OF CLASS WORK ON THE
MIDDLE EAST CONFLICT PROBLEM

Objectives

To allow the students to report on their work and results.

To stimulate a discussion of the possible approaches to the problem and the value of quantitative techniques.

Required readings

Safran, Nadav, "The Big Powers and the Middle East," From War to War, The Arab-Israeli Confrontation 1948-1967. New York: Pegasus (1969), ch. III., pp. 89-142.

Additional readings

Boulding, Kenneth E., "National Images and International Systems." A Multi Method Introduction to International Politics (Edited by William D. Coplin and Charles W. Kegley, Jr.). Chicago: Markham Publishing Co. (1971), pp. 360-380.

Russett, Bruce M., "The Calculus of Deterrence." International Politics and Foreign Policy, Second Edition (Edited by James N. Rosenau). New York: The Free Press (1969), pp. 359-369.

Discussion questions

Do the analyses performed during the workshop reveal any possible explanations of the occurrence of conflict in the Middle East?

To what extent are variables within the Mid East countries (e.g., GNP) related to Mid East conflict? To what extent is conflict accounted for by the actions of the United States and the Soviet Union?

Could any of the relationships discovered have been used to anticipate developments in the Middle East situation? Could they be used now for that purpose?

What other types of data would be useful in analyzing the Middle East conflict?

Session 11. Lecture
INTERNATIONAL ALLIANCES

Objectives

To discuss the nature and formation of international alliances.

Required readings

Holsti, Ole, and John D. Sullivan, "National and International Linkages: France and China as Non-Conforming Bloc Members." Linkage Politics (Edited by James N. Rosenau). New York: The Free Press (1969), pp. 147-198.

Singer, J. David and Melvin Small, "Alliance Aggregation and the Onset of War." Quantitative International Politics (Edited by Singer). New York: The Free Press (1968), pp. 247-286.

Additional readings

Friedman, J. R., C. Bladen, and S. Rosen (eds.), Alliance in International Politics. Boston: Allyn and Bacon (1970), Chapters by Friedman, pp. 3-32; Modelski, pp. 63-73; Olson and Zeckhauser, pp. 175-198; and Russett, pp. 238-258.

Riker, William H., The Theory of Political Coalitions. New Haven: Yale University Press (1962).

Discussion questions

To what extent can single factors such as outside threat explain the formation of alliances?

Do alliance members usually share equal burdens of alliance maintenance?

Under what conditions will a small state contribute to an alliance the same proportion of its wealth as a large state?

What can a larger state, such as the United States, do to maintain the cohesiveness of an alliance such as NATO?

To what extent do growing numbers of alliances indicate a growing probability of war?

Session 12. Workshop

QUANTITATIVE INVESTIGATION OF THE EFFECT OF A
CRISIS ON ALLIANCES

Objectives

To allow the students to formulate and test hypotheses about the behavior of alliance members during a crisis.

To allow a comparison of the behavior of members of the involved alliance with an opposing alliance (i. e. , Warsaw Pact nations with NATO).

Required readings

Galtung, Johann, "East-West Interaction Patterns." Social Processes in International Relations (Edited by Louis Kriesberg). New York: John Wiley and Sons, Inc. (1968), pp. 272-307.

"The WEISAL/T Data-File," Student Manual for Data-File Analysis, pp. I-46 to I-50.

Additional readings

Mueller, John E. (ed.), Approaches to Measurement in International Relations. New York: Appleton-Century-Crofts (1969).

Russett, Bruce M., et al., World Handbook of Political and Social Indicators. New Haven, Conn.: Yale University Press (1964).

Discussion questions

None for this workshop period. The students may wish to look over the discussion questions for the next session.

Session 13. Discussion

RESULTS OF CLASS WORK ON ALLIANCE PROBLEM

Objectives

To allow the students to report on their approaches to the alliance problem and their results.

To stimulate a discussion of the values and limitations of such investigations.

Required readings

Denton, Frank H., and Warren Phillips, "Some Patterns in the History of Violence," Journal of Conflict Resolution, Vol. XII, No. 2 (June, 1968), pp. 182-195.

Wilkenfeld, Jonathan, "Domestic and Foreign Conflict Behavior of Nations." A Multi-Method Introduction to International Politics (Edited by William D. Coplin and Charles W. Kegley, Jr.). Chicago: Markham Publishing Company (1971), pp. 189-206.

Additional readings

Banks, Arthur, and Robert Textor, Cross Policy Survey. Cambridge, Mass.: M.I.T. Press (1963).

Coplin, William D., and Charles W. Kegley, Jr. (eds.), A Multi-Method Introduction to International Politics. Chicago: Markham Publishing Company (1971).

Tanter, Raymond, "Dimensions of Conflict Behavior Within and Between Nations, 1958-1960," Social Processes in International Relations (Edited by Louis Kriesberg). New York: John Wiley & Sons, Inc. (1968).

Verba, Sidney, "An Assumption of Rationality and Non-Rationality in Models of the International System," International Politics and Foreign Policy, Second Edition (Edited by James N. Rosenau). New York: The Free Press (1969), pp. 217-231.

Discussion questions

How did you conceptualize "crisis?" "Alliance Maintenance?"

Did you find that you needed to deal with the concept of cohesion? How did you conceptualize that concept?

How did you operationalize your concepts?

What methods did you use for testing your operational definitions?

Did your perception of the problem, the Czech Crisis, lead you to structure your analysis in any way?

Did you exclude any specific hypotheses or concepts because of the nature of the problem?

Did your findings support your hypotheses or did you find that it was necessary to revise them?

Was the computer essential to your analysis?

Do the analyses performed during the workshops on alliance and conflict reveal any possible explanations for alliance and conflict behavior?

Could any of the relationships discovered have been used to anticipate developments in the Czech crisis? Could they be used to anticipate developments in future crises of this kind?

Session 14. Lecture

INTRODUCTION TO SIMULATION

Objectives

To review the current state of simulation in the study of international political systems.

To define the terms simulation and model.

To discuss the relationships between data-file analysis and simulation.

Required readings

Guetzkow, Harold, "Simulations in International Relations," Simulation in the Study of Politics (Edited by William Coplin). Chicago: Markham Publishing Company (1968), ch. 1, pp. 9-30.

Raser, John, "What and Why is a Simulation." Simulation and Society. Boston: Allyn and Bacon (1969), ch. 1, pp. 3-19.

Specht, R. D., "The Nature of Models." Systems Analysis and Policy Planning (Edited by E. S. Quade and W. I. Boucher). New York: American Elsevier Publishing Company, Inc. (1968), ch. 10, pp. 211-227.

Additional readings

Guetzkow, Harold, et al, Simulation in International Relations. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. (1963).

(This book contains a series of articles dealing with the use of simulation in research and teaching. It is concerned principally with the Inter-Nation Simulation (INS) developed principally at Northwestern University. INS is of importance here because it was an early ancestor of such models as the World Politics Simulation (WPS) and PRINCE).

Milstein, Jeffrey and William Mitchell, "Computer Simulation of International Processes: The Vietnam War and the Pre-World War I Naval Race." Sixth North American Peace Research Conference, November 1968.

(This paper describes the use of statistical techniques to develop a model based on real-world data. This type of model is, thus, an intermediate link between data-file analysis and judgmental models).

"Survey of Simulation and Games," Computer Applications and Implementation Study for the National War College. Washington: Consolidated Analysis Centers Inc. (1971), pp. 15-43, Appendices D, E, and F.

(This report discusses games and simulations from the viewpoint of the National War College. Brief descriptions of over 50 models are given in Appendix D. Appendix E contains detailed descriptions of the more important ones, and Appendix F has a comprehensive bibliography on simulation and games).

Discussion questions

How does simulation differ from data-file analysis?

What use does a model make of real-world data?

For what types of problems might simulation be an appropriate study tool?

Session 15. Lecture/Workshop

THE NATIONAL EXECUTIVE UTILITY SIMULATION (NEXUS)

Objectives

To examine and play a man-computer model of some aspects of the President's decision-making role.

To discuss the development and uses of models of this type.

Required readings

NEXUS User's Manual*

Additional readings

Jones, Curtis H., "At Last: Real Computer Power for Decision Makers" Harvard Business Review (Sept. - Oct. 1970), pp. 75-89.

Steiner, George A., "Rise of the Corporate Planner" Harvard Business Review (Sept. - Oct. 1970), pp. 133-139.

Discussion questions

What is the role of data in the development of NEXUS?

To what extent does NEXUS include concepts relevant to the national decision-maker's interests?

Discuss the use of NEXUS for training in the art of constructing models, and in the art of preparing national budgets.

*NOTE:

All material for this topic was developed by:

Mr. Roger MacGowan
Department of Defense Computer Institute
U. S. Naval Station Annex
Washington, D. C. 20390

Inquiries about obtaining the User's Manual and the computer program should be addressed to him.

Session 16. Lecture

PROGRAMMED INTERNATIONAL COMPUTER ENVIRONMENT
(PRINCE)

Objectives

To discuss the general structure, objectives, and rules of play of the PRINCE model.

To allow the student teams to play at least one decision cycle.

Required readings

"A General Description of PRINCE for the Player," Section I, Student Manual for Simulation.*

Additional readings

Coplin, William, "The Setting for International Interactions," Introduction to International Politics. Chicago: Markham Publishing Company (1971), ch. 7, pp. 185-212.

Gordon, Morton, "Burdens for the Designer of a Computer Simulation of International Relations: The Case of TEMPER," Computers and the Policy-Making Community (Edited by Davis Bobrow and Judah L. Schwartz). Englewood Cliffs, N. J.: Prentice-Hall, Inc. (1968), ch. 11, pp. 222-245.

Guetzkow, Harold, et al., Simulation in International Relations. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. (1963).

Discussion questions

What functions of the foreign policy-maker are included in PRINCE?

Which functions are not included?

The player may limit the flow of transactions into the U. S. Discuss the kinds of goods, etc., for which this is realistic. For what kinds can the policy-maker limit the export? Can you estimate the effect on the balance-of-payments computation of allowing the player only a limitation of imports?

* Part II, Volume II of the WORKSHOP MANUALS.

What is the function of the "PR" act in PRINCE? Can you give some real-world examples of PR acts?

How much of the PRINCE output would the decision-maker actually have an opportunity of seeing?

Session 17. Workshop
STUDENT PLAY OF PRINCE

Objective

To allow the teams to continue their play of PRINCE.

Required readings

Newspaper file on the PRINCE nations* and issues.

Additional readings

Guetzkow, Harold, "A Use of Simulation in the Study of Inter-Nation Relations," Simulation in International Relations (Guetzkow, Alger, Brody, Noel, and Snyder). Englewood Cliffs, N. J.: Prentice-Hall Inc. (1963), ch. 2, pp. 24-38.

Discussion questions

Can you trace the immediate past history of the PRINCE nations and their interactions?

What fractions of the trade of each nation do you think is represented by its trade with the other PRINCE nations?

Can you characterize the overall relationships between pairs of PRINCE nations as either "friendly" or "not friendly?"

*The United States, Russia, France, India, and Pakistan

Session 18. Lecture/Discussion

ANALYTICAL BASIS OF THE PRINCE MODEL/
POST-GAME CRITIQUE

Objectives

To present and discuss the analytical basis of the PRINCE model.

To explain the decision rules underlying the model responses to the players' policies.

To allow the teams to report on the results of their play.

To allow the class to discuss their views of the model's validity and value for studying the international political system.

Required readings

"PRINCE: An Analytical Description for the Player," Section II, Part II, Vol. II. WORKSHOP MANUALS.

Additional readings

Noel, Robert C., "Evolution of the Inter-Nation Simulation," Simulation in International Relations (Guetzkow, Alger, Brody, Noel, and Snyder). Englewood Cliffs, N. J.: Prentice-Hall, Inc. (1963), ch. 4, pp. 69-102.

Discussion questions

Is aggregating all economic interactions among nations into the one quantity "transactions" valid? What alternatives can you suggest?

What role did the 16 issues serve in PRINCE?

Is the concept of a "Punishment-Reward" act an adequate representation of international interactions?

Also see discussion questions for Session 16.

Session 19. Lecture/Discussion

SUMMARY AND CRITIQUE OF SIMULATION/
THE VALUE OF SIMULATION TO THE DECISION-MAKER

Objectives

To give the students some insight into the nature and structure of models by presenting a comparison of two models of some aspects of national decision-making.

To discuss current trends in simulation.

To encourage class discussion on the value of simulation.

Required readings

Raser, John, "Validity, or What are Games Really Good For?" Simulation and Society. Boston: Allyn and Bacon, Inc. (1969), ch. 7, pp. 137-159.

Quade, E. S., "Pitfalls and Limitations." Systems Analysis and Policy Planning. New York: American Elsevier Publishing Company Inc. (1968), ch. 19, pp. 345-363.

Additional readings

Simon, Herbert A., Models of Man. New York: John Wiley & Sons (1957).

Teichroew, Daniel and John Francis Lubin, "Computer Simulation—Discussion of the Technique and Comparison of Languages," Communications of the ACM, Vol. 9, No. 10 (October, 1966), pp. 723-741.

Discussion questions

Assume that one goal of the players of NEXUS and PRINCE is to be re-elected. What actions are suggested by a play of NEXUS? by a play of PRINCE? How do they differ?

Assume that you have been asked to design a model for use in an elective course at the Senior War Colleges. What characteristics should the model have and what areas should be included? (Interpret "areas" to mean both geographic areas and subject matter; i. e., economic, sociological, military, etc.).

What uses for models and simulations can you see as desirable?

Session 20. Discussion

THE ROLE AND VALUE OF QUANTITATIVE TECHNIQUES
IN POLICY-MAKING

Objectives

To review the methodology presented during the course.

To place quantitative work in this field into the context of policy decision-making.

To stimulate the students to express freely their ideas about the place of this methodology in their future work.

Required reading

Quade, E. S., "When Quantitative Models are Inadequate," Systems Analysis and Policy Planning (Edited by Quade and W. I. Boucher). New York: Elsevier (1968), pp. 324-344.

Additional readings

Forbes, Hugh D. and Edward R. Tufte, "A Note of Caution in Causal Modelling." American Political Science Review, Vol. LXII, No. 4 (December, 1968), pp. 1258-1264.

Knorr, Klaus and James N. Rosenau (Editors), Contending Approaches to International Politics. Princeton, N. J.: Princeton University Press (1969).

Discussion questions

Why has there been a growing dissatisfaction with the "traditional" approach to international relations?

How have quantitative techniques contributed to the formulation and testing of theory in international relations?

How have quantitative techniques contributed to making foreign policy?

Would the policy-maker find quantitative techniques more useful for handling short term crises or for formulating long-term policy objectives?

Contrast the differences between data-analysis and simulation.

Is a "behavioral" approach to international relations inconsistent with a "realist" approach?

ALTERNATIVE COURSE ORGANIZATIONS

This course package was designed with the requirements of the senior service schools in mind. This does not, of course, rule out its use at other institutions. The purpose of this section is to discuss some ways in which the subject matter and/or organization of the course might be tailored for differing purposes.

Shorter Course

An outline of the course topics is shown in Table 2. The two major sections, The Analysis of Quantitative Data and Simulation, are designed to be essentially independent. To produce a shorter course, either section could be given alone. For example, a 14-session course in Data-File Analysis could consist of:

- Section I. Introduction and motivation for the use of
 quantitative techniques
- Section II. Lectures and workshops
- Section IV. Summary discussion of the value of this
 type of work

To reduce the number of sessions still further, the major points of three Section I lectures could be combined and given in one session, and the final discussion period could be omitted, since some time for discussion has been planned after each individual workshop exercise. For a still shorter course, the work on either the Mid-East problem (Sessions 7-10) or the Alliance problem (Sessions 11-13) could be omitted, although such deletions would alter the logical sequence of ideas in the current course plan.

Table 2. Course Outline

Section I. Perspectives: The Role of Analysis in International Politics

<u>Session</u>	<u>Activity</u>	<u>Subject</u>
1	Lecture:	Data and the International Policy-Maker
2	Lecture:	The Utilization of Quantitative Research in Policy Analysis: Past Examples and Future Prospects
3	Lecture:	Data, Computers, and Research Design

Section II. The Analysis of Quantitative Data

4	Lecture:	Introduction to Data-File Operations	
	Workshop:	Display and Examination of Data	
5	Lecture:	Concepts of National Power	
6	Workshop:	Quantitative Aspects of National Power	
7	Lecture:	Theories of Conflict and War	
8	Lecture:	Inferential Statistics and Regression	
	Lecture:	Presentation of a Class Exercise: The Middle-East Conflict Problem	
9	Workshop:	Quantitative Investigation of U. S. Policy Objectives and Actions in the Middle East	..
10	Discussion:	Results of Class Work on the Middle-East Problem	..
11	Lecture:	International Alliances	
12	Lecture:	Quantitative Investigation of the Effect of a Crisis on Alliances	..
13	Discussion:	Results of Class Work on the Alliance Problem	..

Table 2. (Continued)

Section III. Simulation

<u>Session</u>	<u>Activity</u>	<u>Subject</u>
14	Lecture:	Introduction to Simulation
15	Lecture:	Simulation and Planning: Presentation of NEXUS (National Executive Utility Simulation)
	Workshop:	Student Play of NEXUS
16	Lecture:	Presentation of PRINCE (Programmed Inter- national Computer Environment)
	Workshop:	Student Play of PRINCE
17	Workshop:	Student Play of PRINCE
18	Lecture:	Analytical Basis of the PRINCE Model
	Discussion:	Post-Game Critique of PRINCE
19	Lecture:	Summary and Critique of Simulation
	Discussion:	Value of Simulation to the Policy-Maker

Section IV. Course Review and Evaluation

20	Discussion:	The Role and Value of Quantitative Techniques in Policy-Making
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For a course in simulation, the six sessions of Section III could be given alone. In this case, it would be desirable to allow more time for the presentation and play of PRINCE. If more time is not available, the play of NEXUS could be omitted. This would require that the comparison of the two models and their different viewpoints, which has valuable teaching possibilities, would also have to be deleted.

Courses for Other Institutions

While this course is planned for the senior service school level, other uses are certainly possible. For example, the course could be given on an undergraduate level to 4th-year political science majors who have had at least basic courses in statistics. It is probably too specialized for undergraduates who have not had introductory courses in international relations.

For 1st-year graduate political science majors specializing in international relations, the subject matter of the lectures is probably too elementary. They might, however, find the workshops useful in conjunction with their methods and statistics courses.

In schools where the students have already taken courses in statistics, the statistical lectures could be omitted and the time for the workshops increased.

The Presentation of Statistical Concepts

The lectures in this course can by no means be considered a substitute for a formal course in statistics. Elementary techniques are introduced and explained only in sufficient detail to allow the students to use them. The lectures attempt to stress the meaning of the results obtained through use of the technique; its mathematical basis must be accepted by the student on faith. However, these brief descriptions of formal techniques allow this

course to be essentially self-contained. They are, moreover, sufficiently complete to satisfy the objective of the course; namely, to present an introduction to the use of quantitative methods in an area in which such use is relatively new.